

1. INTRODUCTION

PROSPERITY's SAFETY CERTIFIED CAPACITORS are designed for surge or lightning immunity in modem facsimile and other equipments. The capacitors of series FK are class X1/Y2 compliant respectively.

The green type capacitors in FK and FH series are manufactured by using environmentally friendly materials without lead or cadmium.

The terminations are composed of plated nickel and pure tin to feature the superior leaching resistance during soldering.

2. FEATURES

- a. High reliability and stability.
- b. Small size and high capacitance
- c. RoHS compliant
- d. Safety standard approval by EN132400:1994+A2+A3+A4, IEC60384-14, EN60384-14:2005 and UL60950
- e. Certificate number: R 500416666 and R 50118381 by TUV E231248 by UL

3. APPLICATIONS

- a. Modem.
- b. Facsimile.
- c. Telephone.
- d. Other electronic equipment for lightning or surge protection and isolation.



4. HOW TO ORDER

<u>FK</u>	<u>08</u>	<u>X</u>	<u>102</u>	<u>K</u>	<u>502</u>	<u>E</u>	<u>F</u>	<u>G</u>
<u>PDC Family</u>	<u>Size</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Safety Class</u>	<u>Packaging</u>	<u>Thickness</u>	<u>Control Code</u>
FK: X1Y2 FH: X2Y3	Inch (mm) 08: 1808(4520) 12: 1812(4532) 21: 2211(5728)	N: C0G X: X7R	Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: R47=0.47pF 0R5=0.5pF 1R0=1.0pF 100=10x10 ⁰ =10pF	B=±0.1pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10% M=±20%	302: X2Y3 (Impulse 2.5KV) 502: X1Y2 (Impulse 5.0KV)	E: Tape and Reel, Embossed Tape B: Bulk	C: 1.25±0.10mm D: 1.40±0.15mm E: 1.60±0.20 mm F: 2.00±0.20 mm G: 2.50±0.30 mm	G: RoHS compliant

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	Tmax (mm)	M _B min (mm)
1808 (4520)	4.60±0.30	2.00±0.20	2.20	0.26
1812 (4532)	4.60±0.30	3.20±0.30	2.80	0.26
2211 (5728)	5.70±0.40	2.80±0.30	2.80	0.30

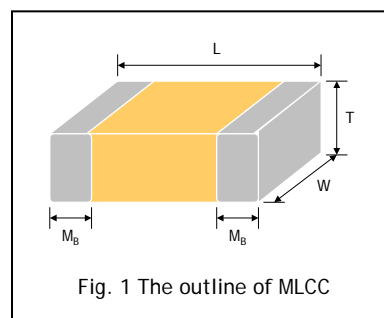


Fig. 1 The outline of MLCC

6. GENERAL ELECTRICAL DATA

Dielectric	NP0		X7R	
Size	1808, 1812		1808, 1812, 2211	
Rated voltage (WVDC)	250Vac		250Vac	
Capacitance range*	X1Y2 Class	3pF ~ 470pF	X1Y2 Class	100pF ~ 2200pF
	X2Y3 Class	3pF ~ 1000pF	X2Y3 Class	150pF ~ 4700pF
Capacitance tolerance	Cap≤5pF : B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF : C (±0.25pF), D (±0.5pF) Cap≥10pF : F (±1%), G (±2%), J (±5%), K (±10%)		J (±5%), K (±10%), M (±20%)	
Tan δ*	Cap<30pF : D.F≤1/(400+20C) Cap≥30pF : D.F≤0.10%		≤2.5%	
Insulation resistance at 500Vdc for 60 seconds	≥100GΩ or R·C≥1000 whichever is smaller		≥10GΩ or R·C≥500Ω·F whichever is smaller	
Operating temperature	-55 to +125°C			
Capacitance characteristic	±30ppm /		±15%	
Termination	Ag/Ni/Sn (lead-free termination)			

* NP0: Apply 1.0±0.2Vrms, 1.0MHz±10%, at 25°C ambient temperature

X7R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.

7. CAPACITANCE RANGE

7.1 X1Y2 (FK) Class

SIZE	1808	1812	1808	1812	2211
DIELECTRIC	NPO	NPO	X7R	X7R	X7R
RATED VOLTAGE	250Vac	250Vac	250Vac	250Vac	250Vac
CERTIFICATED	TUV / UL	TUV	TUV	TUV / UL	TUV / UL
CLASS	X1Y2	X1Y2	X1Y2	X1Y2	X1Y2
Capacitance	3.0pF (3R0)				
	3.3pF (3R3)				
	3.9pF (3R9)				
	4.7pF (4R7)				
	5.0pF (5R0)				
	5.6pF (5R6)				
	6.8pF (6R8)				
	8.2pF (8R2)				
	10pF (100)				
	12pF (120)				
	15pF (150)				
	18pF (180)				
	22pF (220)				
	27pF (270)				
	33pF (330)				
	39pF (390)				
	47pF (470)				
	56pF (560)				
	68pF (680)				
	82pF (820)				
	100pF (101)				
	120pF (121)				
	130pF (131)				
	150pF (151)				
	180pF (181)				
	220pF (221)				
	270pF (271)				
	330pF (331)				
	390pF (391)				
	470pF (471)				
	560pF (561)				
	680pF (681)				
820pF (821)					
1,000pF (102)					
1,200pF (122)					
1,500pF (152)					
1,800pF (182)					
2,200pF (222)					

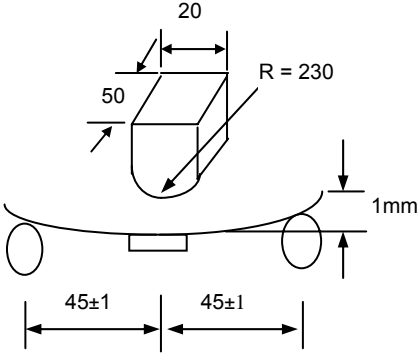
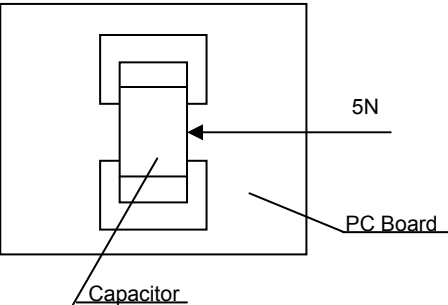
7.2 X2Y3(FH) Class

SIZE		1808	1812	1808	1812
DIELECTRIC		NPO	NPO	X7R	X7R
RATED VOLTAGE		250Vac	250Vac	250Vac	250Vac
CERTIFICATED CLASS		TUV / UL X2Y3	TUV X2Y3	TUV / UL X2Y3	TUV / UL X2Y3
Capacitance	3.0pF (3R0)				
	3.3pF (3R3)				
	3.9pF (3R9)				
	4.7pF (4R7)				
	5.0pF (5R0)				
	5.6pF (5R6)				
	6.8pF (6R8)				
	8.2pF (8R2)				
	10pF (100)				
	12pF (120)				
	15pF (150)				
	18pF (180)				
	22pF (220)				
	27pF (270)				
	33pF (330)				
	39pF (390)				
	47pF (470)				
	56pF (560)				
	68pF (680)				
	82pF (820)				
	100pF (101)				
	120pF (121)				
	130pF (131)				
	150pF (151)				
	180pF (181)				
	220pF (221)				
	270pF (271)				
	300pF (301)				
	330pF (331)				
	390pF (391)				
	470pF (471)				
	560pF (561)				
	680pF (681)				
	820pF (821)				
1,000pF (102)					
1,200pF (122)					
1,500pF (152)					
1,800pF (182)					
2,200pF (222)					
2,700pF (272)					
3,300pF (332)					
3,900pF (392)					
4,700pF (472)					

8.RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition	Requirements												
1.	Visual and Mechanical	---	<ul style="list-style-type: none"> * No remarkable defect. * Dimensions to conform to individual specification sheet. 												
2.	Capacitance	Class I (NP0): 1.0±0.2Vrms, 1MHz±10%	* Capacitance is within specified tolerance												
3.	D.F. (Dissipation Factor)	Class II (X7R): 1.0±0.2Vrms, 1KHz±10%	Class I (NP0): Cap≥30pF, D.F.≤0.1%; Cap<30pF, D.F.≤1/(400+20C) Class II (X7R): ≤2.5%												
4.	Temperature Coefficient	With no electrical load. <table border="1"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> </thead> <tbody> <tr> <td>NP0</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> </tr> </tbody> </table>	T.C.	Operating Temp	NP0	-55~125°C at 25°C	X7R	-55~125°C at 25°C	<table border="1"> <thead> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>NP0</td> <td>Within ±30ppm/°C</td> </tr> <tr> <td>X7R</td> <td>Within ±15%</td> </tr> </tbody> </table>	T.C.	Capacitance Change	NP0	Within ±30ppm/°C	X7R	Within ±15%
T.C.	Operating Temp														
NP0	-55~125°C at 25°C														
X7R	-55~125°C at 25°C														
T.C.	Capacitance Change														
NP0	Within ±30ppm/°C														
X7R	Within ±15%														
5.	Insulation Resistance	* To apply voltage at 500VDC for 60 sec.	Class I (NP0) : ≥100GΩ or RxC≥1000Ω-F whichever is smaller. Class II (X7R) : ≥10GΩ or RxC≥500Ω-F whichever is smaller.												
6.	Dielectric Strength	* To apply voltage: X Capacitor: 1075Vdc (4.3UR) Y Capacitor: 1500Vac * Duration: 60 sec.	* No evidence of damage or flashover during test.												
7.	Solderability	* Solder temperature: 245±5°C * Dipping time: 5±0.5 sec.	75% min. coverage of all metalized area.												
8.	Resistance to Soldering Heat	* Solder temperature: 260±5°C * Dipping time: 10±1 sec * Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. * Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 48±4 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) and 48±4 hrs (Class II)	* No remarkable damage. * Cap change: NP0: within ±2.5% or ±0.25pF whichever is larger. I.R: More than 1GΩ X7R: within ±10% I.R: More than 1GΩ												
9.	Humidity (Damp Heat) Steady State	* Test temp.: 40±2°C * Humidity: 90~95% RH * Test time: 500+24/-0hrs. * Applied Voltage:250Vac * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) and 48±4 hrs (Class II)	* No remarkable damage. * Cap change: NP0 within ±5% or ±0.5pF whichever is larger X7R within ±15% * D.F Value: NP0 ≤ 0.25% X7R: ≤5.0% * I.R. ≥1GΩ * Dielectric strength satisfies the specified initial value												
10.	Endurance	* Impulse Voltage: Each individual capacitor shall be subjected to a Vp = 2.5KV (X2 Class) and 5.0KV (X1Y2 Class) impulse for three times before applied to endurance test. Additional pulse test 10/700μs before endurance test for Y3 class (IEC60950) *Test Temp.: 125±3°C * Test time.: 1000+48/-0 hrs. * Applied Voltage: X capacitor: 1.25UR (312.5Vac) Y capacitor: 1.70UR (425Vac) Once every hour the voltage shall be increased to 1000Vrms for 0.1 sec. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) and 48±4 hrs (Class II)	* Appearance : No mechanical damage. * Cap change: NP0 within ±5% or ±0.5pF whichever is larger X7R within ±20% * D.F Value: NP0 ≤ 0.25% X7R: ≤5.0% * I.R. ≥1GΩ * Dielectric strength satisfies the specified initial value												

8.RELIABILITY TEST CONDITIONS AND REQUIREMENTS (Cont.)

No.	Item	Test Condition	Requirements
11.	Resistance to Flexure of Substrate	<p>* Capacitors mounted on a substrate. The board shall be bent 1mm with a rate of 1mm/sec.</p> 	<p>* No remarkable damage. * Cap change is less than 10%. (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</p>
12.	Adhesive Strength of Termination	<p>* Capacitors mounted on a substrate. A force of 5N applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10 ± 1 sec.</p> 	<p>* No remarkable damage or removal of the terminations.</p>
13.	Passive Flammability	<p>* Volume sample: 21.56mm^3 * Flame exposure time: 5 sec Max.</p>	<p>* Capacitor didn't burn at all</p>
14.	Active Flammability	<p>* The capacitors applied U_R (250Vac). Then each sample shall be subjected to 20 discharges from a tank capacitor, charge to a voltage that, when discharged, place U_i 2500V for X2Y3, U_i 5000V for X1Y2 across the capacitor under test. The interval between successive discharges shall be 5 sec.</p>	<p>* The cheese cloth shall not burn with a flame.</p>